July 22, 1941. T. V. HEMMINGSEN 2,250,376

CYLINDER CONSTRUCTION FOR INTERNAL COMBUSTION ENGINES

Filed Feb. 23, 1939 2 Sheets-Sheet 1

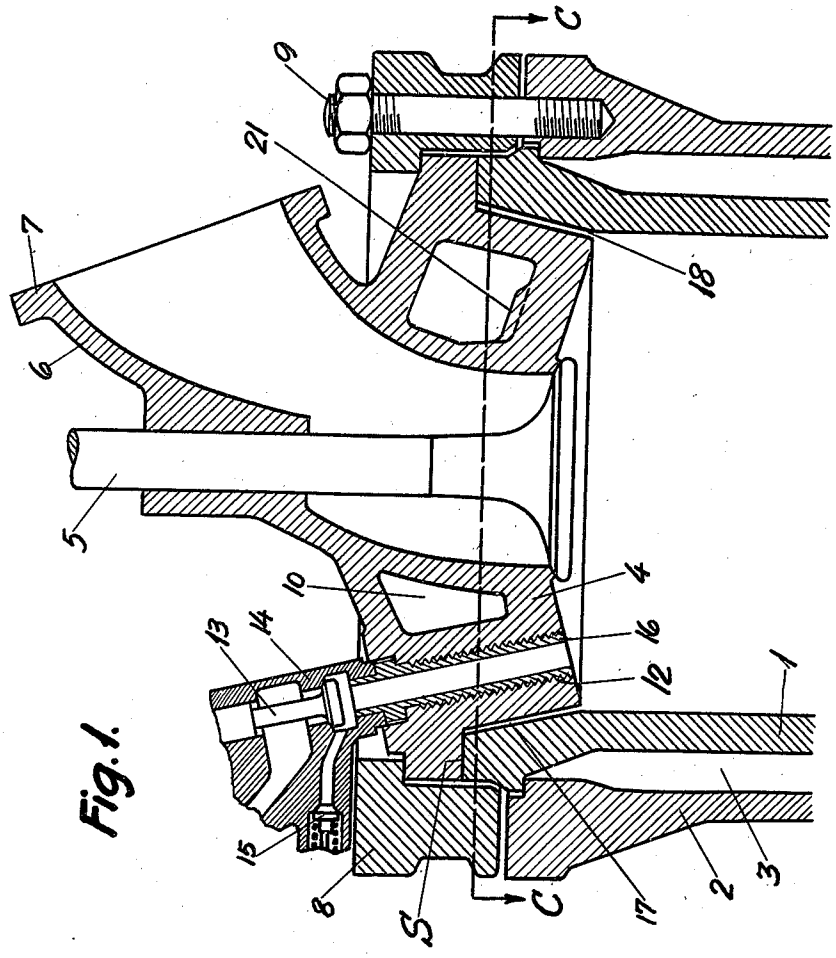


Fig. 1.

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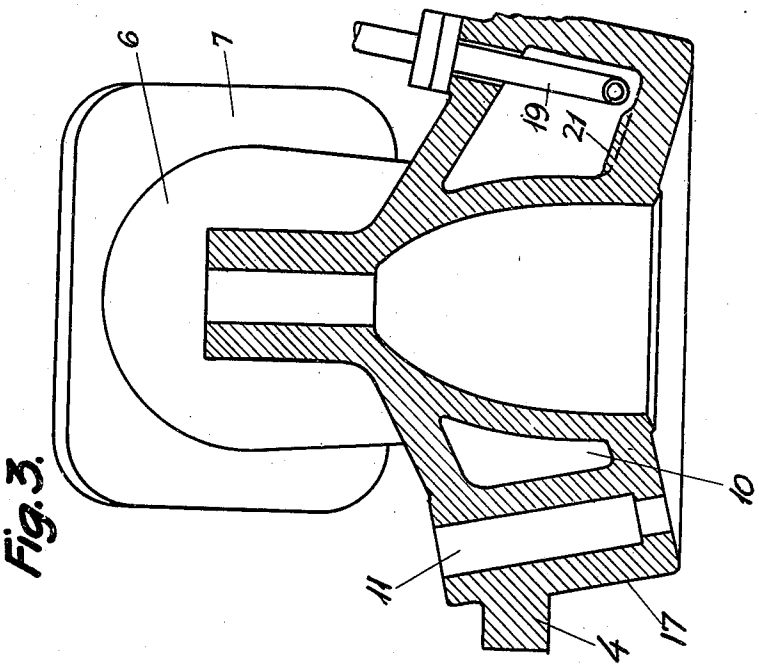


Fig. 3.

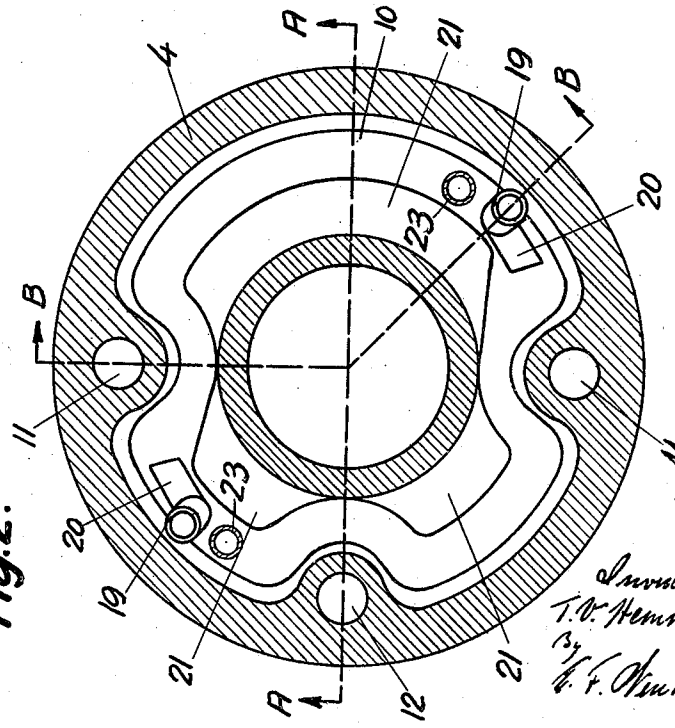


Fig. 2.

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CYLINDER CONSTRUCTION FOR INTERNAL COMBUSTION ENGINES

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Application February 23, 1939, Serial No. 258,029
In Denmark October 19, 1937

5 Claims. (Cl. 123—173)

The invention relates to a cylinder construction for internal combustion engines and has for its main object to procure an especially suitable connection between the cylinder cover and the cylinder or cylinder lining which ensures good cooling conditions.

According to the invention the cylinder cover projects partly into the cylinder, and the sealing or tightening surface between the cylinder and the cylinder cover is spaced from the fire-actuated surfaces of the cylinder so as to enable cooling at the outer side of the cylinder to a greater extent than that corresponding to the fire-actuated part of the inner wall of the cylinder. Further the part of the cylinder in which the cylinder cover projects widens outwardly to a greater diameter than the actual cylinder diameter, and the projecting part of the cover has an outer shape corresponding to the inner shape of the said cylinder part but is of somewhat less dimensions or diameter so as to provide an intermediate space allowing extensions due to the heating to take place.

The part of the cylinder surrounding the projecting part of the cylinder cover may preferably be of conical shape. Besides said part is preferably given the same or substantially the same thickness of wall as the cylindrical main part of the cylinder.

As a consequence of the performance indicated the cooling of the cylinder head, i. e. especially of the outer part of the cylinder lining, will be effective, and the said part of the lining will besides be able to bear the influences from the heating without risk for breaking as the arising of great detrimental heat stresses will not occur.

In order to also obtain an effective cooling of the cylinder cover itself said cover is preferably utilized to constitute a housing for an exhaust valve arranged substantially at the middle of the cover which allows for the best possible room for water cooling spaces, and besides an advantage is attained that the valve seat is well cooled.

The supply of cooling water to the inner of the cylinder cover is further arranged according to the invention in such a manner that the cooling water is directed straight against the inner side of that wall of the cylinder cover, the outer side of which is exposed to the heat of combustion and care is taken to procure a rotating movement of the cooling water along said wall. In this manner an effective cooling of the heated surface of the cylinder cover is obtained which is of great importance for the durability of the latter. As such a rotating water stream, however, will be liable to by-pass corners at the boss of the valve, the inner-side of said wall is preferably shaped in such a manner as to guide parts of the rotating cooling water to places which otherwise would not or only difficultly be accessible to the influence of the cooling water.

Further objects of the invention and details of a cylinder construction according to the invention will appear from the following description and the claims.

The invention is illustrated on the drawings in which—

Fig. 1 shows a vertical section through an embodiment of a cylinder head constructed in accordance with the invention, the section being laid along the line A—A in Fig. 2,

Fig. 2 a horizontal section along the line C—C in Fig. 1, and

Fig. 3 a vertical section along the line B—B in Fig. 2.

1 designates the cylinder lining, 2 the jacket surrounding the lining, and 3 the water cooling space situated between the said two parts. 4 designates the cylinder cover, which also constitutes housing for an exhaust valve 5, the cover terminating upwardly in a connecting branch with a flange 7 for connection to an exhaust pipe not shown.

As it appears from Fig. 1 the cover 4 projects into the upper part of the cylinder lining 1 with a portion of conical shape as indicated by 17, the corresponding part of the cylinder lining having a similar conical shape as indicated by 18. Between the two surfaces 17 and 18 an annular space is free serving to allow for extensions due to the heating. The upper widened conical part of the cylinder lining has substantially the same thickness of wall as the cylindrical main part of the lining whereby it is secured that severe heat stresses will not occur.

As it further appears from Fig. 1 the sealing or tightening surface S between the cover 4 and the lining 1 is situated a distance corresponding to the height of the conical surfaces above the point at which the heated surface of the lining terminates whereby it has been possible to extend the water cooling space 3 beyond i. e. above the said point so that an effective cooling may be obtained.

The cover 4 contains water cooling spaces 10 and as it appears from Figs. 2 and 3 the supply of cooling water takes place through a pair of supply pipes 19 arranged opposite to each other, the lower ends of said pipes being bent in such a manner that their outlets 20 are substantially

tangentially directed in relation to the circumference of the cooling spaces **10**, and besides the outlets are directed little obliquely downwards. Thus the cooling water streams directly against the inner-side of the heated wall and obtains a rotating movement. **21** indicates low projecting guiding ribs or low pockets serving to guide parts of the rotating water towards such parts of the cover which otherwise would not be effectively cooled. The water outlet pipes are shown at **23**.

11 designates bores for the accommodation of fuel valves whereas **12** indicates a bore for the admission of starting air. The starting valve **13** itself and its housing **14** are mounted outside the cylinder cover, said housing also containing a safety valve **15**. The bore **12** is as shown in Fig. 1 provided with a lining or pipe **16** serving to protect the walls of the bore against the strong variations of temperature occurring in said bore.

The cover **4** is secured to the lining **1** by means of an annular or ring-shaped member **8** which is clamped to the jacket **2** by means of screws **9**. This arrangement allows for a simple exchange and mounting of the cover.

The invention is not restricted to the embodiment shown and described which only serves as an example for the purpose of illustrating the principle of the invention but the latter may be performed in other ways within the scope of the claims.

I claim:

1. In a cylinder construction for internal combustion engines, an exhaust valve housing having a passage for the exhaust gases, an exhaust valve located centrally in said housing for controlling the mouth of said passage, cooling spaces formed in the housing and situated circumferentially entirely around the lower part of said passage, said housing being externally conically shaped as a conical plug and being adapted for insertion with a small play into a correspondingly shaped upper part of a combustion cylinder so as to constitute cover for the cylinder, said housing being further provided with an outwardly extending flange having a ground underface serving for tightening against a corresponding ground face on the top of the cylinder.

2. A cylinder construction according to claim 1, in which said exhaust valve housing has bores for the accommodation of starting and fuel injection valves.

3. In a cylinder construction for internal combustion engines, comprising a cylinder, a cylinder cover partly projecting into the cylinder constituting a housing for the exhaust valve, a starting valve, a housing therefor mounted outside the cylinder cover, and a bore in said cover leading from the starting valve to the combustion space of the cylinder.

4. A cylinder construction according to claim 3, in which the said bore is provided with a lining for protecting the walls of the bore against strong variations of temperature.

5. A cylinder construction according to claim 3, in which the housing of the starting valve also accommodates a safety valve.

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